OCR A Level Computer Science

H046/01 Computing Principles

Name:_____ Group: A/G Mark: ___ / 63 Grade: __

INSTRUCTIONS

Do not use a calculator. Answer **all** the questions.

1 A company releases a utility called RAMStore. The utility creates a virtual storage drive from an area of the computer's RAM.

(a) Describe what is meant by the term utility software.

.....
.....

.....
.....

.....
.....

.....
..... **[2]**

(b) Give **one** advantage of using RAM as storage in this way.

.....
.....

.....
..... **[1]**

(c) The utility periodically copies what is in the RAM drive to secondary storage, such as a hard disk. Explain why this is necessary.

.....
.....

.....
.....

.....
.....

.....
..... **[2]**

(d) It is important that enough RAM is left for the operating system to use. Describe a technique that allows operating systems to overcome a lack of available RAM.

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
..... **[4]**

2 * Modern computers tend to have magnetic or solid state (flash) hard drives. Discuss which hard drive you would recommend for a keen video games player to use on their desktop PC.

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
..... **[9]**

3 Below are extracts from the ASCII and EBCDIC character sets.

ASCII

Denary Value	65	66	67	68	69	70	71	72	73	74	75	76	77
Character	A	B	C	D	E	F	G	H	I	J	K	L	M
Denary Value	78	79	80	81	82	83	84	85	86	87	88	89	90
Character	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

EBCDIC

Denary Value	193	194	195	196	197	198	199	200	201	...	209	210	211	212
Character	A	B	C	D	E	F	G	H	I	...	J	K	L	M
Denary Value	213	214	215	216	217	...	226	227	228	229	230	231	232	233
Character	N	O	P	Q	R	...	S	T	U	V	W	X	Y	Z

(a) Explain, referring to ASCII and EBCDIC, what would happen if computers were to use different character sets when communicating.

.....
.....

.....
.....

.....
.....

.....
..... **[2]**

(b) Write a function that given the denary value of an EBCDIC uppercase letter, returns the denary value of an ASCII uppercase letter. If a value is entered that doesn't correspond to an uppercase EBCDIC letter the function should return -1

e.g.
```
convert(201)   returns
73       convert(209)
returns 74 convert(78)
returns -1
```

```
function convert(ebValue)
```
.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....
endfunction

[5]

4 The following is a program written using the Little Man Computer instruction set.

```
start  LDA   one
       OUT
       LDA   zero
       OUT
       LDA   count
       SUB   one
       STA   count
       BRP   start
       HLT
one    DAT   1
zero   DAT   0
count  DAT   3
```

(a) Describe the difference between the STA and LDA instructions.

.....
.....

.....
.....

.....
..... **[2]**

(b) Identify the type of memory addressing the program uses.

.....
..... **[1]**

(c) State the output this program generates.

.....
.....

.....
.....

.....
.....

.....
.....

.....
..... **[3]**

(d) Explain the buses and registers used when the line `SUB one` is executed.

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
..... **[5]**

5 A software development company is building an operating system for a mobile phone that is in the process of being designed.

a. Give **one** reason the phone needs an operating system.

.....
.....

.....
..... **[1]**

(b) Explain how the developers could use virtual machines.

.....
.....

.....
.....

.....
.....

.....
..... **[2]**

(c) One of the developers is responsible for writing the code for what happens when the CPU receives an interrupt. Outline what the code must do.

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
.....

.....
..... **[6]**

(d) The developers follow the waterfall lifecycle.

(i) List **three** stages of the waterfall lifecycle.

1 .....
.....

.....
2.....
.....
3..... **[3]**

(ii) Justify why the waterfall lifecycle is suited to the development of the operating system.

.....
.....

.....
.....

.....
.....

.....
..... **[2]**

(iii) Give **one** disadvantage of using the waterfall lifecycle to develop the operating system.

.....
.....

.....
.....

.....
..... **[1]**

6 (a) Convert the binary number 01101111 to a hexadecimal number.

.....
.....

.....
..... **[1]**

(b) Convert the denary number −19 to an 8-bit number using:

(i) Two's complement representation.

.....
.....

.....
.....

.....
..... **[1]**

(ii) Sign and Magnitude representation.

.....
.....

.....
.....

.....
..... **[1]**

c) The two values below are stored using unsigned binary. Calculate the subtraction of 01110010 from 11000011. Show your working.

11000011
01110010 –

_____

_____

[2]

7 **(a)** Processors following the Von Neumann Architecture use registers.
(i) Describe what is meant by the term ‘register’.

.....
.....

.....
.....

.....
..... **[2]**

(ii) Give **one** other feature of the Von Neumann Architecture.

.....
.....

.....
..... **[1]**

(b) An example of a register is the Accumulator (ACC).
Give a Little Man Computer instruction that will copy the contents of the accumulator into memory when executed.

.....
..... **[1]**

(c) Another register is the Program Counter (PC).
(i) State what the Program Counter holds.

.....
.....

.....
.....

.....
..... **[1]**

(ii) Give the name of **two** Little Man Computer instructions that may change the contents of the Program Counter when executed.

1 .....
2
..... **[2]**

END OF QUESTION PAPER